Opportunities and Obstacles to Reducing the Environmental Footprint of Natural Gas Development in Uintah Basin (October 14)

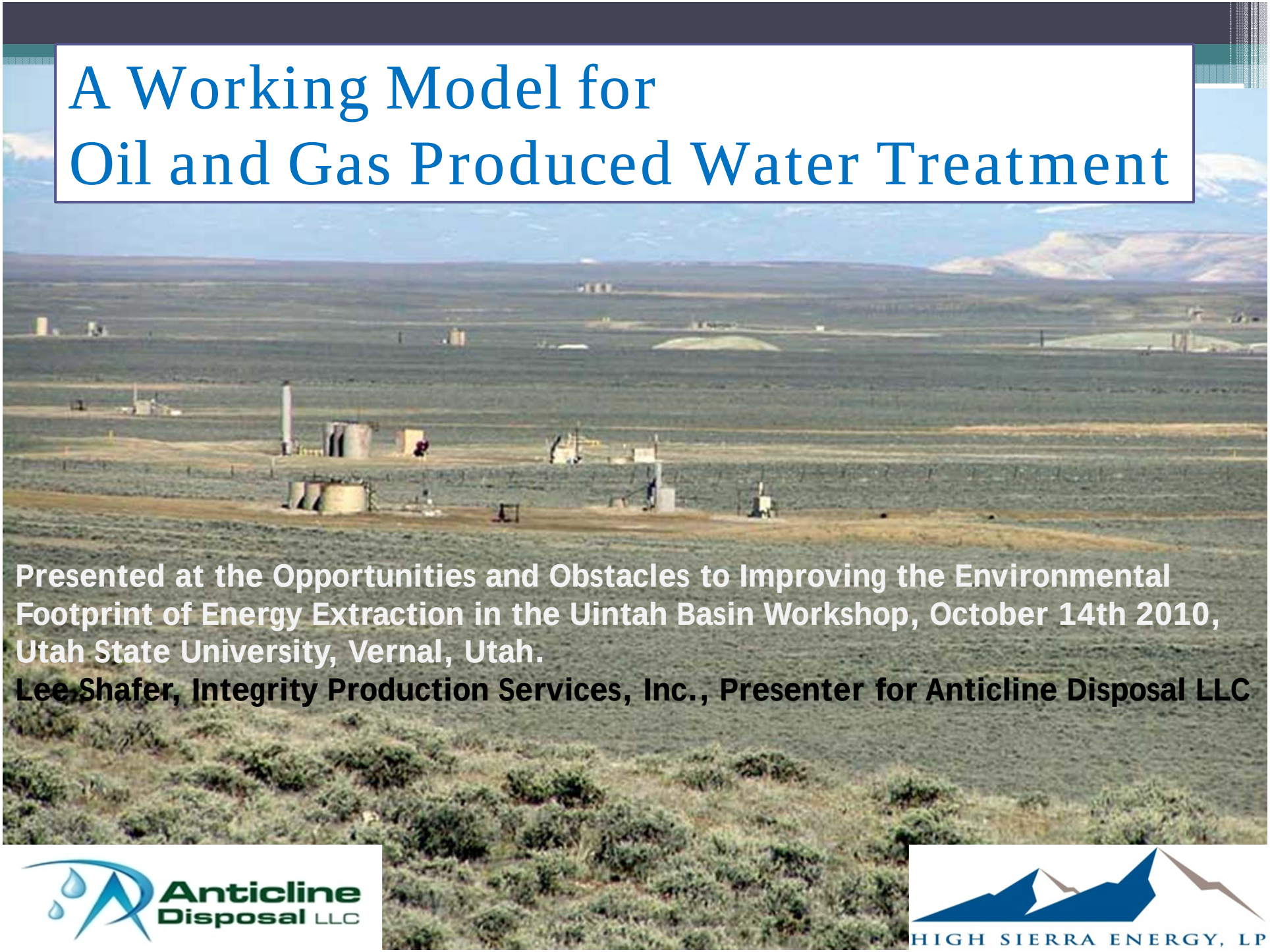
2010

10-14-2010

SLIDES: A Working Model for Oil and Gas Produced Water Treatment

Lee Schafer

A Working Model for Oil and Gas Produced Water Treatment



Presented at the Opportunities and Obstacles to Improving the Environmental Footprint of Energy Extraction in the Uintah Basin Workshop, October 14th 2010, Utah State University, Vernal, Utah.

Lee Shafer, Integrity Production Services, Inc., Presenter for Anticline Disposal LLC

Anticline Disposal LLC

HIGH SIERRA ENERGY, LP

Anticline Disposal numbers

- Since 2006, treated and recycled more than 22 million barrels of water.
- Anticline's pipeline delivery system has eliminated 186,500 truck haul trips.
- Can treat more than 60,000 barrels a day, 365 days a year.
- Discharge quality water is less than 100 mg/l TDS
- and exceeds drinking water standards for boron.

- Typical lab results, "non-detect":
  - ✓ VOCs
  - ✓ Methanol
  - ✓ Diesel and Gasoline range organics
  - ✓ Sulfate

Anticline Disposal LLC

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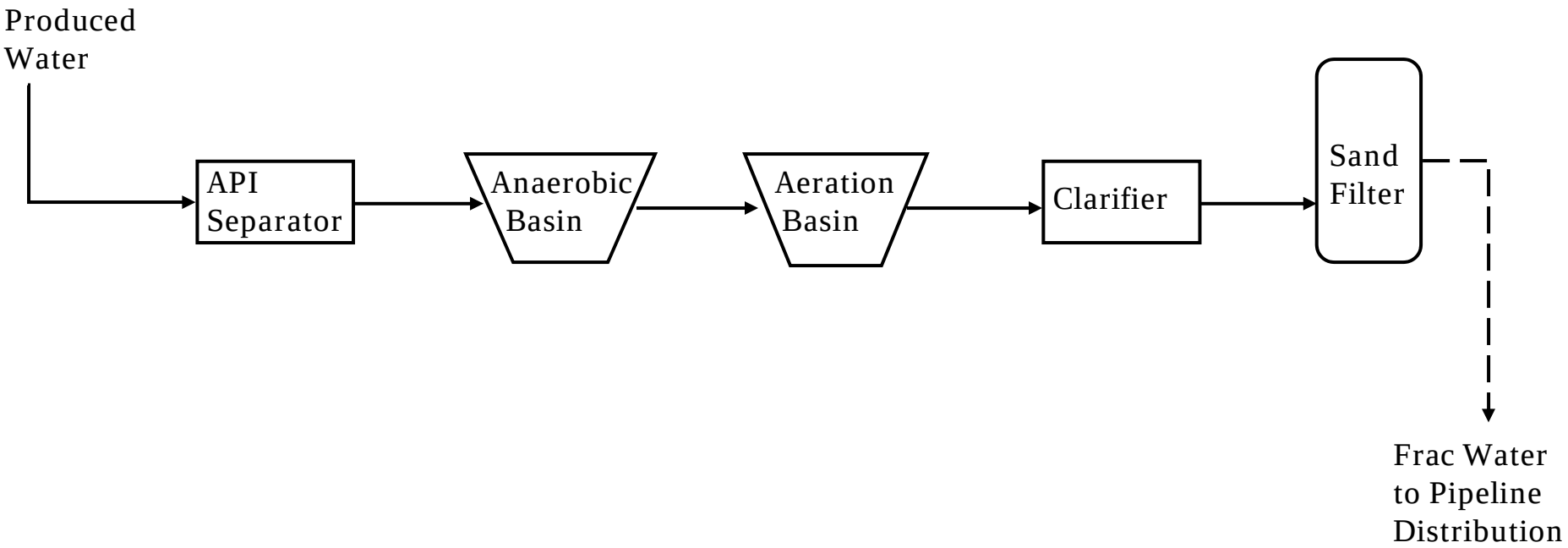
Anticline Disposal "Frac" Process



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Process patented by Anticline Disposal

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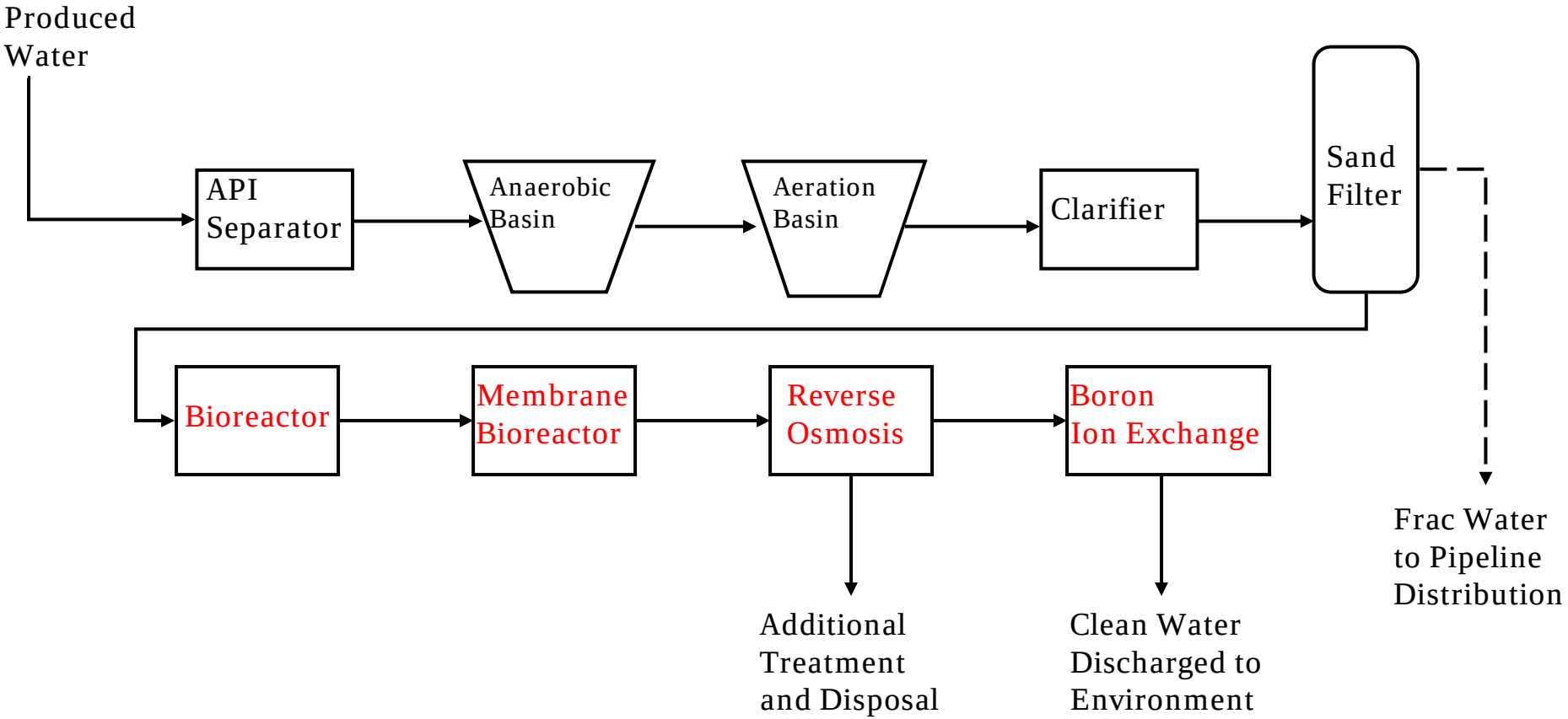
Anticline Disposal "Discharge" Process



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Process patented by Anticline Disposal

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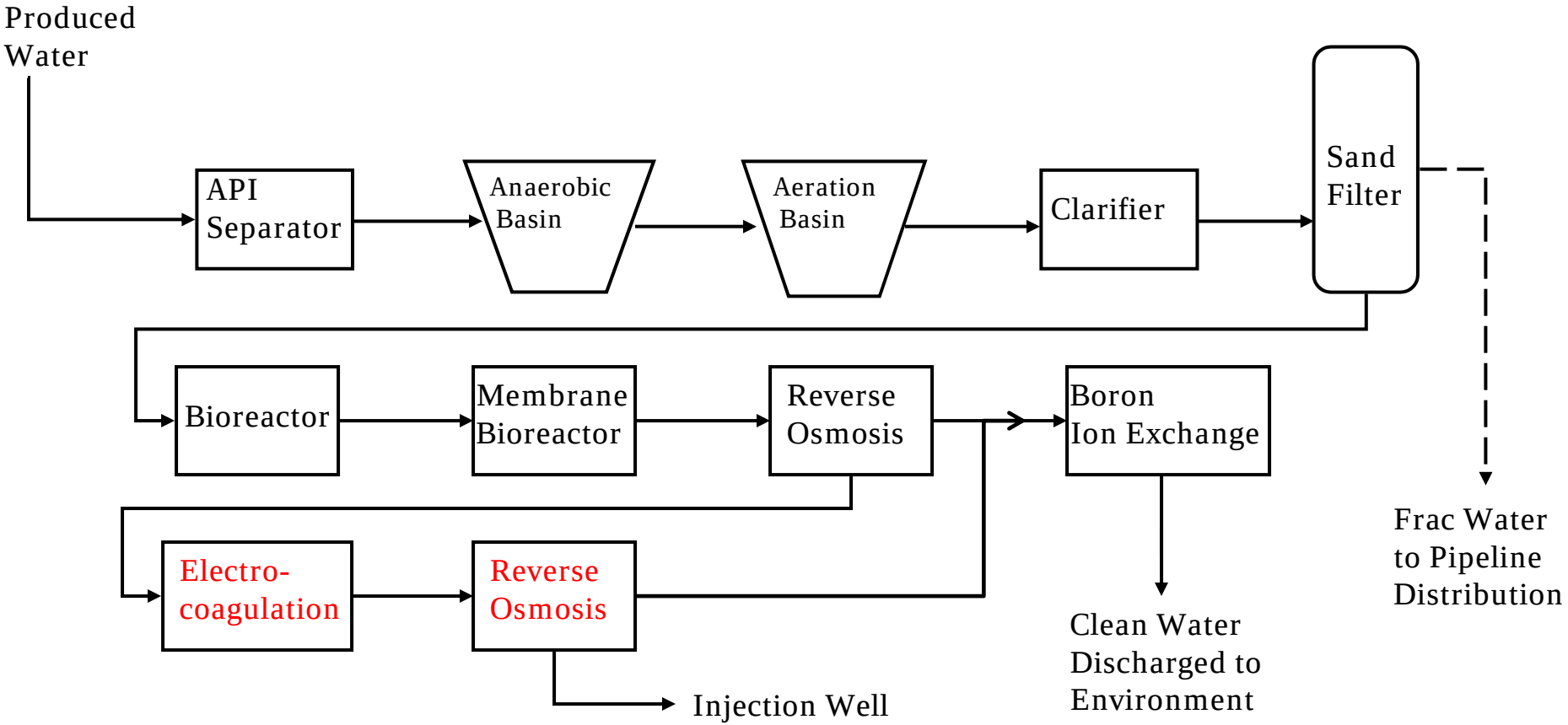
Anticline Disposal "Discharge" Process



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Anticline Disposal Feed Parameters vs. Discharge Limits and Results

Parameter	typical Feed Range	WYPDES Discharge Limits WY0054224	Results March 2010
O&G, mg/l	50 to 2,400	10	Non-Detect
TDS, mg/l	8,000 to 15,000	500	41
Chloride, mg/l	3,600 to 6,750	230	18
Sulfate, mg/l	10 to 100	3,000	Non-Detect
Conductivity, µS/cm	8,000 to 20,000	7,500	78
pH	6.5 to 8.5	6.5 to 9	7.34

Whole Effluent Toxicity Testing	Raw water	Salts added
Ceriodaphnia dubia, 80% survival, 48 hr	**100 % survival**	**100%**
Pimephales promelas, 80% survival, 96 hr	**98.3% survival**	**100%**

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Feed Parameters vs. Anticline Disposal Internal Discharge Limits and Results

Parameter	Typical Feed Range	Anticline Disposal Additional Discharge Standards	Results March 2010
BTEX, µg/l	28,000 to 80,000	Non-Detect	Non-Detect
Gasoline Range Organics, µg/l	88,000 to 420,000	Non-Detect	Non-Detect
Diesel Range Organics, mg/l	77 to 1100	Non-Detect	Non-Detect
Methanol, mg/l	40 to 1500	Non-Detect	Non-Detect
Boron, mg/l	15 to 30	0.75	Non-Detect

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